

REMARKS

Applicant respectfully requests reconsideration and allowance of the subject application in view of the foregoing amendments and the following remarks.

Claims 1, 26-31, 41, 43-45, 51, 55, 57-59 and 67 are pending in the application, with claims 1, 41, and 55 being independent. Claims 1, 41, and 55 are amended herein. Support for the claim amendments and additions can be found in the original disclosure. No new matter has been added.

STATEMENT OF SUBSTANCE OF INTERVIEW

Initially, Applicant wishes to thank the Examiner for conducting an interview with Applicant's representative Elizabeth Zehr, on Thursday March 5, 2009.

During the interview, Applicant's representatives and the Examiner discussed the §101 rejection as applied to claim 1 as well as the §103 rejection as applied to claims 1 and 41.

With respect to the §101 rejection as applied to claim 1, the Examiner indicated that amending the claim to include a processor would overcome the rejection. Applicant thanks the Examiner for this indication and has presented claim 1 accordingly.

With respect to the §103 rejection, the Examiner indicated that amending claim 1 to include more detail pertaining to how the results from a previous node classifier is not discarded would overcome the Viola reference. In addition, the Examiner indicated that claim 41 overcomes the Viola reference. Applicant thanks the Examiner for this indication and has presented claims 1 and 40 accordingly.

The subject matter of the interview, and other remarks, are included below under their respective sections to assist the Examiner in more fully understanding the Applicant's position on the rejections under §103.

§ 112, SECOND PARAGRAPH REJECTIONS

The Office rejected claims 1 and 26-31 under 35 U.S.C. §112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. This rejection is respectfully traversed.

Specifically, the Office maintains: "Claim 1 recites the limitation 'the booster filter stage' in line 4. There is insufficient antecedent basis for this limitation in the claim." (Office Action, Page 3).

Applicant has herein amended claim 1 cure the indefinite rejection cited by the Office. Specifically, Applicant has amended the original recitation of "the booster filter stage" in line 4 of claim 1 to read "the boosting filter stage." Claims 26-31 depend from independent claim 1. Accordingly, Applicant submits that claims 1 and 26-31 as amended comply with the requirement of 35 U.S.C. §112, second paragraph.

In accordance with the above, the Applicant respectfully requests reconsideration and withdrawal of the rejection to claims 1 and 26-31 under 35 U.S.C. § 112, second paragraph.

§ 101 REJECTIONS

The Office rejected claims 1, 26-31, 55, 57-59, and 67 under 35 U.S.C. §101 because the claimed invention is directed to non-statutory subject matter. Specifically, with respect to claims 1 and 26-31, the Office maintains: "While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process." (Office Action, Page 4). Furthermore, with respect to claims 55, 57-59, and 67, the Office maintains: "Claim 55 defines an 'apparatus'. However, while the preamble defines an 'apparatus', the body of the claim lacks definite structure indicative of a physical apparatus. Furthermore, the specification indicates that the invention may be embodied as pure software." (Office Action, Page 4). Applicant respectfully traverses the rejection, and requests that the rejection be reconsidered and withdrawn, and requests that the rejection be reconsidered and withdrawn.

Applicant has amended claim 1 to recite statutory subject matter. Specifically, claim 1 has been amended to recite, in part: "*processing via a processor . . .*". (Emphasis added). Claims 26-31 depend from independent claim 1. Applicant submits that claims 1 and 26-31 as amended comply with the statutory subject matter requirement of 35 U.S.C. §101.

Additionally, Applicant has amended claim 55 to recite statutory subject matter. Specifically, claim 55 has been amended to include "one or more processors; and memory having instructions executable by the one or more processors..." Claims 57-59, and 67

depend from independent claim 55. Applicant submits that claims 55 and 57-59, and 67 as amended comply with the statutory subject matter requirement of 35 U.S.C. §101.

Therefore, Applicant respectfully requests reconsideration and withdrawal of the rejection to claims 1, 26-31, 55, 57-59, and 67.

§ 102 REJECTIONS

Claims 55, 57-59, and 67 stand rejected under 35 U.S.C. § 102(b) as being anticipated by “Robust Real-Time Object Detection” (“Viola”). Applicant respectfully traverses and further requests that the rejections be reconsidered and withdrawn for at least the reasons that follow.

Independent claim 55, as presently presented, recites:

An apparatus comprising:
one or more processors; and
memory having instructions executable by the one or more processors to detect at least one human face within a digital image, the memory including:

a boosting filter stage configured to process a set of initial candidate portions of digital image data using a boosting chain to produce a set of intermediate candidate portions, wherein the boosting chain includes a plurality of boosting chain nodes to identify candidate portions and a boot strap function following each of the plurality of boosting chain nodes, the boot strap function to use a weak learner of a previous boosting chain node in training another boosting chain node of the boosting chain; and

a post-filter stage configured to process said set of intermediate candidate portions to produce a set of final candidate portions, wherein at least one of said final candidate portions includes detected face image data.

In general, Viola is directed to a frontal face detection system. (Introduction). Specifically, a cascade of classifiers is constructed “by training classifiers using AdaBoost. Starting with a two-feature strong classifier, an effective face filter can be obtained by adjusting the strong classifier threshold to minimize false negatives.” (The Attentional Cascade, Page 11).

Applicant respectfully submits that Viola fails to disclose each of the elements recited in Applicant's claim 55. Specifically, Viola fails to disclose “the boot strap function to use a weak learner of a previous boosting chain node in training another boosting chain node of the boosting chain.” The Office recites with reference to the rejection of claim 55:

Viola et al discloses an apparatus, that which does all the processing of Viola comprising: . . . a boosting filter stage to process a set of initial candidate portions of digital image data carried out by AdaBoost using a boosting chain . . . wherein the boosting chain includes a plurality of boosting chain nodes/classifiers . . . to identify candidate portions . . . and a function following each of the plurality of boosting chain nodes during training . . . (page 14, paragraph 3).

(Office Action, Page 6).

Applicant submits that the boosting chain of Viola fails to disclose the elements of claim 55 because the boosting chain of Viola discards the results from a previous node classifier while training the sub-sequential new classifier. Applicant's claim 55, on the other hand, does not discard the results from a previous node classifier as disclosed in Viola, but rather uses “a weak learner of a previous boosting chain node in training another boosting chain node of the boosting chain.” Applicant relies on the algorithm given in Table 2 on page 15 of Viola in support of this assertion.

Accordingly, claim 55 is believed allowable for at least the foregoing reasons.

The amendments to claim 55 are supported by the specification on at least page 24, line 9 through page 25, line 6, and on page 26, lines 3-8. No new matter is added.

Dependent claim 57-59, and 67 depend from Independent claim 55 and are believed allowable by virtue of this dependency, as well as for additional features that they recite. Applicant also respectfully requests individual consideration of each dependent claim.

§ 103 REJECTIONS

Claims 1, 26-31, 41, 43-45, and 51 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Viola in view of "A Subspace Approach to Face Detection with Support Vector Machines" ("Ai"). Applicant respectfully traverses the rejection, and requests that the rejection be reconsidered and withdrawn.

Independent claim 1, as presently presented, recites:

A method for use in detecting faces within a digital image, the method comprising:

processing via a processor, in a boosting filter stage, a set of initial candidate portions of digital image data to produce a set of intermediate candidate portions, the boosting filter stage including:

a boosting chain having a plurality of boosting chain nodes to identify candidate portions and a boot strap function following each of the plurality of boosting chain nodes, *the boot strap function to use a weak learner of a previous boosting chain node in training another boosting chain node of the boosting chain; and*

processing via the processor, the set of intermediate candidate portions in a post-filter stage to produce a set of final

candidate portions, wherein the post-filter stage includes an image pre-processing process, a color-filter process, and a support vector machine (SVM) filter process.

(Emphasis added). Applicant respectfully submits that Viola and Ai whether taken alone or in combination, fail to teach or suggest the recitations of claim 1. Specifically, Viola in view of Ai fails to teach or suggest “the boot strap function to use a weak learner of a previous boosting chain node in training another boosting chain node of the boosting chain.”

Applicant submits that Table 2 on page 15 of Viola teaches a boosting chain which discards the results from a previous node classifier while training the sub-sequential new classifier. However, Applicant’s claim 1 recites “a weak learner of a previous boosting chain node in training another boosting chain node of the boosting chain” rather than discarding the previous boosting classifier as taught by Viola. Therefore, Viola fails to teach or suggest the recitations of claim 1.

Furthermore, Ai was not cited for teaching a boosting chain and Ai fails to remedy the deficiencies in Viola noted above with respect to claim 1.

Accordingly, claim 1 is believed allowable for at least the foregoing reasons.

Due to the Applicant’s earnest belief that the claim 1, as rejected under Section 103(a), is believed allowable for reciting elements which are not taught or suggested in the cited references, Applicant will not address motivation to combine with respect to claim 1 during this response. However, Applicant hereby reserves the right to further challenge motivation to combine the cited references.

The amendments to claim 1 are supported by the specification on at least page 24, line 9 through page 25, line 6, and on page 26, lines 3-8. No new matter is added.

Dependent claims 26-31 depend from independent claim 1 and are believed allowable by virtue of this dependency, as well as for additional features that they recite. Applicant also respectfully requests individual consideration of each dependent claim.

Independent claim 41, as presently presented, recites:

A computer-readable medium having computer-implementable instructions for causing at least one processing unit to perform acts comprising:

detecting possible human face image data within a digital image using a multiple stage face detection scheme that includes:

a boosting filter stage to process a set of initial candidate portions of digital image data to produce a set of intermediate candidate portions using a plurality of boosting chain nodes and a bootstrap function following each of the plurality of boosting chain nodes, *the bootstrap function to adjust a sample weight initialized for a current boosting classifier of a current boosting chain node based on a classification error rate of a previous boosting node*; and

a post-filtering stage configured to process said set of intermediate candidate portions to produce a set of final candidate portions, wherein the post-filter stage includes an image pre-processing process, a color-filtering process, and a support vector machine (SVM) filtering process.

(Emphasis added). Applicant respectfully submits that Viola and Ai whether taken alone or in combination, fail to teach or suggest the recitations of claim 41. Specifically, Viola in view of Ai fails to teach or suggest “the bootstrap function to adjust a sample weight initialized for a current boosting classifier of a current boosting chain node based on a classification error rate of a previous boosting node” as recited in claim 41.

The Office recites with reference to the rejection of claim 41:

Viola et al discloses a computer-readable medium having computer-implementable instructions for causing at least one processor unit to perform acts comprising: . . . a boosting filter stage to process a set of initial candidate portions of digital image data carried out by AdaBoost to produce a set of intermediate candidate portions (page 2, paragraph 4), using a plurality of boosting chain nodes . . . and a boot strap function (as noted above in the citation of Rowley et al) following each of the plurality of boosting chain nodes during training . . . (page 14, paragraph 3).

(Office Action, Page 10).

Applicant submits that the cited portion of Viola teaches discarding the results from a previous node classifier while training the sub-sequential new classifier rather than basing a current boosting classifier of a current boosting chain "on a classification error rate of a previous boosting node" as recited in claim 41. (Emphasis added).

Ai was not cited for teaching a boosting chain and Ai fails to remedy the deficiencies in Viola noted above with respect to claim 41.

Accordingly, claim 41 is believed allowable for at least the foregoing reasons.

The amendments to claim 41 are supported by the specification on at least page 25, lines 16-22. No new matter is added.

Dependent claims 43-45 and 51 depend from independent claim 41 and are believed allowable by virtue of this dependency, as well as for additional features that they recite. Applicant also respectfully requests individual consideration of each dependent claim.

CONCLUSION

For at least the foregoing reasons, it is respectfully submitted that claims 1, 26-31, 41, 43-45, 51, 55, 57-59 and 67 are in condition for allowance. Applicant respectfully requests reconsideration and withdrawal of the rejections and an early notice of allowance.

The arguments and amendments presented herein were necessitated by the most recent Office Action, and could not have been presented previously because Applicant earnestly believed that the claims were in condition for allowance at the time of filing the previous response.

If any issue remains unresolved that would prevent allowance of this case, Applicant requests that the Examiner contact the undersigned attorney to resolve the issue.

Respectfully Submitted,

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